

5 WHAT IS CLAIMED IS:

1. An anode forming part of a solid state electrochemical device, said anode bonded to a dense electrolyte layer and comprising a porous three-dimensional solid phase comprising:

(a) an electrocatalytic noble metal phase comprising a plurality of noble metal particles;

(b) an ionic conducting phase comprising a plurality of ionic conductor particles;

wherein said noble metal phase and ionic conducting phase are interspersed and wherein the mean size of said noble metal particles is substantially equal to or larger than the mean size of said ionic conducting particles.

2. The anode of claim 1 wherein the solid phase of the anode is comprised of about 1% to about 95% noble metal phase by volume.

3. The anode of claim 2 wherein the solid phase of the anode is comprised of about 1% to about 50% noble metal phase by volume.

4. The anode of claim 3 wherein the solid phase of the anode is comprised of about 5% noble metal phase by volume.

5. The anode of claim 3 wherein the solid phase of the anode is comprised of about 30% noble metal phase by volume.

6. The anode of claim 3 wherein the solid phase of the anode is comprised of about 50% noble metal phase by volume.

- 5 7. The anode of claim 1 wherein the mean size of said noble metal particles is at least about twice as large as the mean size of the ionic conductor particles.
8. The anode of claim 7 wherein the mean size of said noble metal particles is at least about four times as large as the mean size of the ionic conductor particles.
- 10 9. The anode of claim 1 wherein the anode forms part of an electrolyte or cathode supported solid oxide fuel cell.
10. The anode of claim 9 wherein the anode is less than about 10 μm thick.
- 15 11. The anode of claim 1 wherein the noble metal comprises palladium.
12. The anode of claim 1 wherein the ion conductor particles are comprised of YSZ.
- 20 13. A solid state electrochemical device comprising a cathode, a dense electrolyte and an anode comprising a porous three-dimensional structure comprising linked particles of an noble metal material and linked particles of an ionic conductor wherein the mean or median size of the noble metal particles is larger than the mean or median size of the ion conducting particles.
- 25 14. The solid state electrochemical device of claim 13 wherein the device is a solid oxide fuel cell.
15. The fuel cell of claim 14 wherein the noble metal comprises palladium.
- 30 16. The fuel cell of claim 14 wherein the mean or median noble metal particle size is at least about 2 times larger than the mean or median ion conductor particle size.

